Praktikum Extraction Feature (Local Ternary Pattern)

Hero Yudo Martono

Juni 2016

LBP 36 unique rotation invariant ???

100	110	108
102	105	104
103	107	102

```
//36 unique rotation invariant uniform
case 3:
        typeLBP[0] = 1;
        if (value == 255)       { typeLBP[1] = 0; }
        else if (value == 127)  { typeLBP[1] = 1; }
        else if (value == 63)   { typeLBP[1] = 2; }
        else if (value == 31)   { typeLBP[1] = 3; }
        else if (value == 15)   { typeLBP[1] = 4; }
        else if (value == 7)    { typeLBP[1] = 5; }
        else if (value == 3)    { typeLBP[1] = 6; }
        else if (value == 1)    { typeLBP[1] = 7; }
        else if (value == 0)    { typeLBP[1] = 8; }
```

```
else if (value == 95)   { typeLBP[1] = 9;  }
else if (value == 111)  { typeLBP[1] = 10; }
else if (value == 119)  { typeLBP[1] = 11; }
else if (value == 47)   { typeLBP[1] = 12; }
else if (value == 79)   { typeLBP[1] = 13; }
else if (value == 55)   { typeLBP[1] = 14; }
else if (value == 87)   { typeLBP[1] = 15; }
else if (value == 103)  { typeLBP[1] = 16; }
else if (value == 91)   { typeLBP[1] = 17; }
```

```
        else if (value == 23) { typeLBP[1] = 18; }
        else if (value == 39) { typeLBP[1] = 19; }
        else if (value == 71) { typeLBP[1] = 20; }
        else if (value == 27) { typeLBP[1] = 21; }
        else if (value == 43) { typeLBP[1] = 22; }
        else if (value == 75) { typeLBP[1] = 23; }
        else if (value == 51) { typeLBP[1] = 24; }
        else if (value == 83) { typeLBP[1] = 25; }
        else if (value == 85) { typeLBP[1] = 26; }

        else if (value == 11) { typeLBP[1] = 27; }
        else if (value == 19) { typeLBP[1] = 28; }
        else if (value == 35) { typeLBP[1] = 29; }
        else if (value == 67) { typeLBP[1] = 30; }
        else if (value == 21) { typeLBP[1] = 31; }
        else if (value == 37) { typeLBP[1] = 32; }
        else if (value == 5)  { typeLBP[1] = 33; }
        else if (value == 9)  { typeLBP[1] = 34; }
        else if (value == 17) { typeLBP[1] = 35; }

        else { typeLBP[0] = 0; typeLBP[1] = 0; }
        break;
    }
  return typeLBP;
}
```

LBP 36 unique rotation invariant ???

200	90	100
110	105	150
80	90	160

```
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        else { typeLBP[0] = 0; typeLBP[1] = 0; }
        break;
    }
    return typeLBP;
}
```
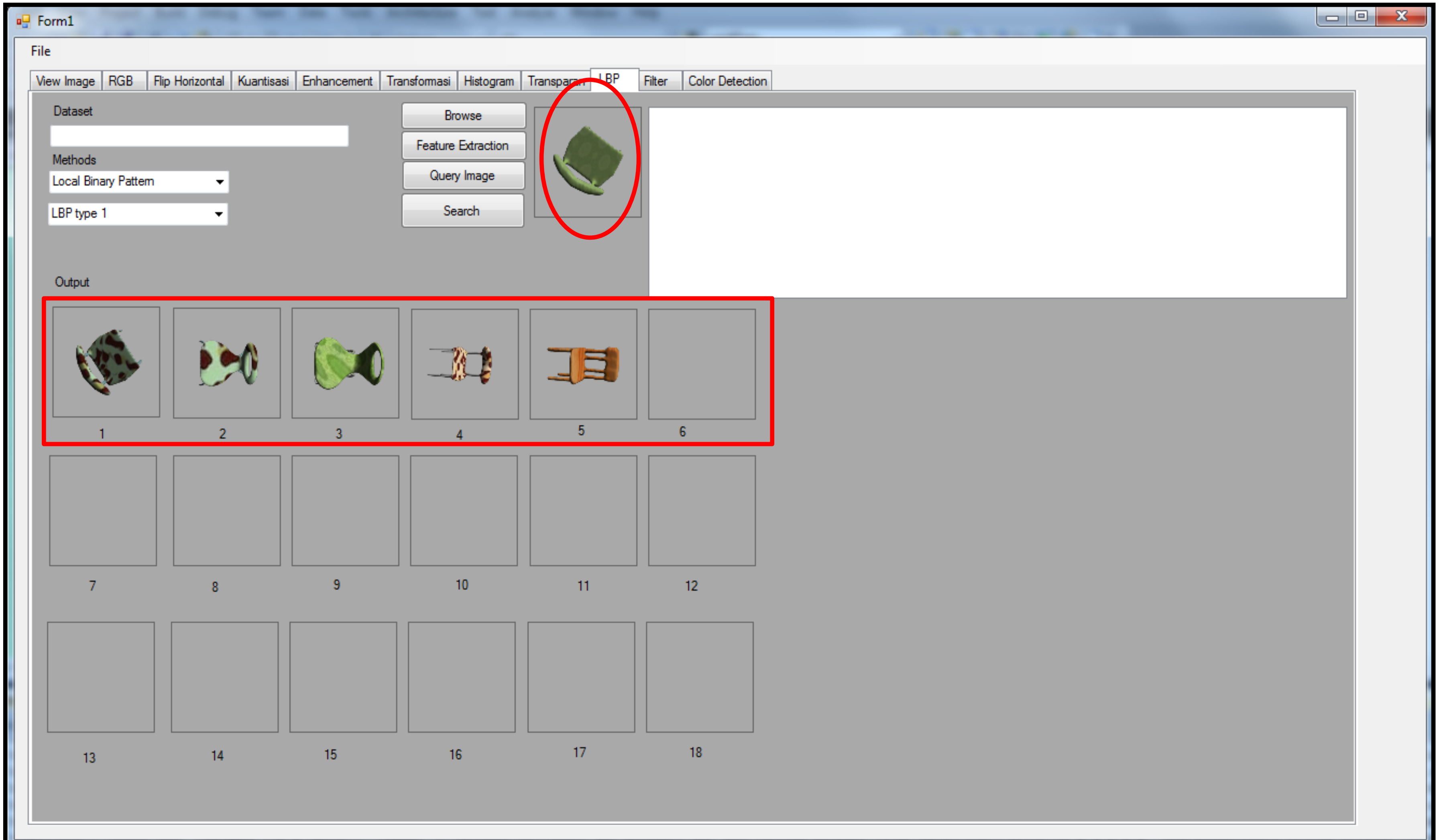
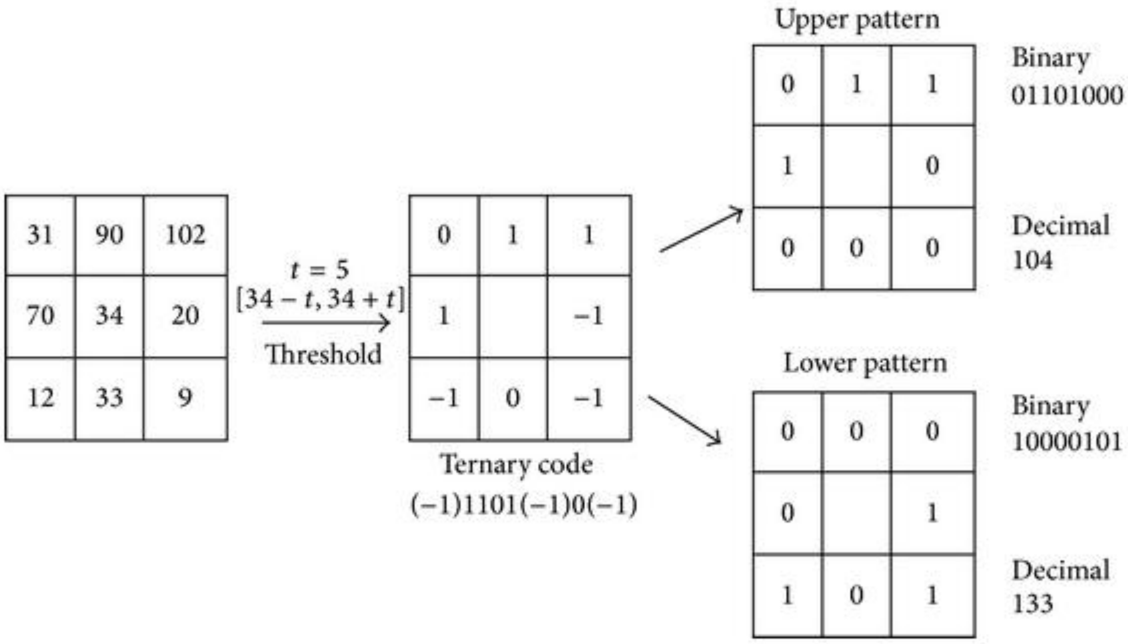

Sistem Pencarian/ Retrieval System

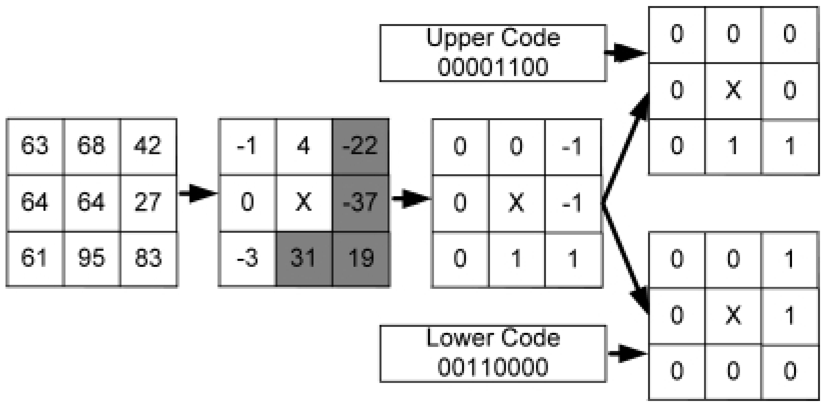


Local Ternary Pattern



http://www.hindawi.com/journals/tswj/2014/373254.fig.004.jpg

Local Ternary Pattern



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Pendahuluan (1)

100	110	108
102	105	104
103	107	102

LTP rotation invariant ?

Upper pattern rotation invariant ?

Lower pattern rotation invariant ?

Pendahuluan (2)

200	90	100
110	105	150
80	90	160

LTP rotation invariant ?

Upper pattern rotation invariant ?

Lower pattern rotation invariant ?

Browse Conference Publications > 2013 6th International Confer ...

Robust local ternary patterns for texture categorization

Authors | References

Published in:
2013 6th International Conference on Biomedical Engineering and Informatics

Date of Conference:
16-18 Dec. 2013

This paper proposes a new image representation for texture categorization, which is based on extension of local binary patterns (LBP). As we know LBP can achieve effective description ability with appearance invariance and adaptability of patch matching based methods. However, LBP only thresholds the differential values between neighborhood pixels and the focused one to 0 or 1, which is very sensitive to noise existing in the processed image. This study extends LBP to local ternary patterns (LTP), which considers the differential values between neighborhood pixels and the focused one as negative or positive stimulus if the absolute differential value is large; otherwise no stimulus (set as 0). With the ternary values of all neighbored pixels, we can achieve a pattern index for each local patch, and then extract the pattern histogram for image representation. Experiments on two texture datasets: Brodats32 and KTH TIPS2-a validate that the robust LTP can achieve much better performances than the conventional LBP and the state-of-the-art methods.

An Affine Invariant Local Ternary Patterns Method

Sebastian Hegenbart[1], Andreas Uhl[1], and Andreas Vécsei[2]

[1]Department of Computer Sciences, University of Salzburg
[2]St. Anna Children's Hospital, Department of Pediatrics
Medical University, Vienna

Technical Report 2013-03 July 2013

Abstract. Local Binary Patterns and various derivatives of the method have been widely used in the field of texture recognition over the past 15 years. A restriction of these methods is their variance with respect to affine transformations of an image. This is caused by the fixed circular neighborhood and the fixed support area of sampling points. The main approach to deal with affine transformations such as rotations is based on modifying or enhancing the encoding scheme of the patterns. In this work we present an extension to Local Ternary Patterns which is based on adaptive elliptic shaped neighborhoods with adaptive support areas of sampling points. We use scale normalized Laplacian maxima in a scale-space to identify interest points within an image. Based on the scale information the multi-scale second moment matrix is computed to estimate the affine transformation at the location of a Laplacian scale-space maximum. Utilizing this information, a scale mask is computed to improve the reliability of scale estimation. Finally Local Ternary Patterns are computed along equidistant points in terms of arc length along the estimated ellipse.

RELAXED LOCAL TERNARY PATTERN FOR FACE RECOGNITION

Jianfeng Ren

BeingThere Centre
Institute of Media Innovation
Nanyang Technological University
50 Nanyang Drive, Singapore 637553.

Xudong Jiang, Junsong Yuan

School of Electrical & Electronics Engineering
Nanyang Technological University
50 Nanyang Avenue, Singapore 639798

ABSTRACT

Local binary pattern (LBP) is sensitive to noise. Local ternary pattern (LTP) partially solves this problem by encoding the small pixel difference into a third state. The small pixel difference may be easily overwhelmed by noise. Thus, it is difficult to precisely determine its sign and magnitude. In this paper, we propose the concept of *uncertain* state to encode the small pixel difference. We do not care its sign and magnitude, and encode it as both 0 and 1 with equal probability. The proposed Relaxed LTP is tested on the CMU-PIE database, the extended Yale B database and the O2FN mobile face database. Superior performance is demonstrated compared with LBP and LTP.

***Index Terms*—** Local Binary Pattern, Local Ternary Pattern, Uncertain State, Relaxed LTP, Face Recognition.

ever, when the ternary code is split into a positive LBP code and a negative LBP code, it may result in a significant information loss. Furthermore, the positive and negative LBP histograms are strongly correlated, and hence a lot of redundant information may reside in those two histograms.

In this paper, the concept of *uncertain* state is introduced. If the pixel difference is within a threshold, it is encoded into the *uncertain* state. In this state, the sign and magnitude of the pixel difference cannot be precisely determined because it may be easily overwhelmed by noise. Based on the concept of *uncertain* state, we propose Relaxed LTP (RLTP). A ternary code is derived by encoding the large pixel difference into two strong states and encoding the small pixel difference into a separate *uncertain* state. Then the pixel difference that belongs to *uncertain* state is equally split into two strong states to represent the fact that the small pixel difference is equally

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Research Article

Completed Local Ternary Pattern for Rotation Invariant Texture Classification

Taha H. Rassem and Bee Ee Khoo

School of Electrical & Electronic Engineering, Universiti Sains Malaysia, Engineering Campus, Nibong Tebal, 14300 Penang, Malaysia

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Academic Editors: G. C. Gini and L. Li

Abstract

Despite the fact that the two texture descriptors, the completed modeling of Local Binary Pattern (CLBP) and the Completed Local Binary Count (CLBC), have achieved a remarkable accuracy for invariant rotation texture classification, they inherit some Local Binary Pattern (LBP) drawbacks. The LBP is sensitive to noise, and different patterns of LBP may be classified into the same class that reduces its discriminating property. Although, the Local Ternary Pattern (LTP) is proposed to be more robust to noise than LBP, however, the latter's weakness may appear with the LTP as well as with LBP. In this paper, a novel completed modeling of the Local Ternary Pattern (LTP) operator is proposed to overcome both LBP drawbacks, and an associated completed Local Ternary Pattern (CLTP) scheme is developed for rotation invariant texture classification. The experimental results using four different texture databases show that the proposed CLTP achieved an impressive classification accuracy as compared to the CLBP and CLBC descriptors.

Regular Articles

Texture analysis using local region contrast

Jiangping He ; Hongwei Ji ; Xin Yang

[+] Author Affiliations

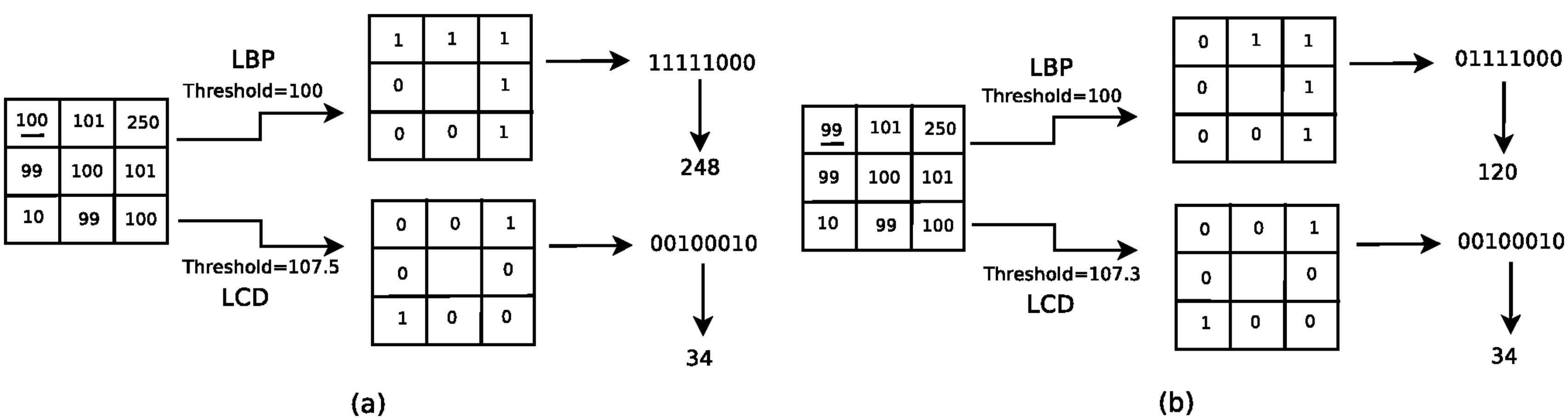
J. Electron. Imaging. 22(2), 023007 (May 09, 2013). doi:10.1117/1.JEI.22.2.023007

History: Received September 29, 2012; Revised March 28, 2013; Accepted April 12, 2013

Abstract

Abstract. The local binary pattern (LBP) operator is a very effective texture descriptor that describes images using texture patterns. However, existing LBP operators discard the texture contrast information by definition and, in addition, they are sensitive to noise. This paper presents a local contrast descriptor (LCD) to represent images using texture contrast by measuring how far neighbors are spread out in a given neighborhood. LCD and LBPs can be combined to improve texture description performance. Furthermore, the LCD is extended to the local ternary contrast descriptor (LTCD) to describe textures using both contrast and magnitude features. Experiments on the UIUC texture database show that the LCD and LBP combinations are more accurate than either descriptor alone and LCD is an easy and efficient complement to LBPs. Experiments on the FERET face database and the database in which the probe sets contain added noise show that LCD, especially LTCD, has promising discriminative power and strong robustness against noise.

Citation Jiangping He ; Hongwei Ji and Xin Yang
"Texture analysis using local region contrast", *J. Electron. Imaging.* 22(2), 023007 (May 09, 2013). ; http://dx.doi.org/10.1117/1.JEI.22.2.023007



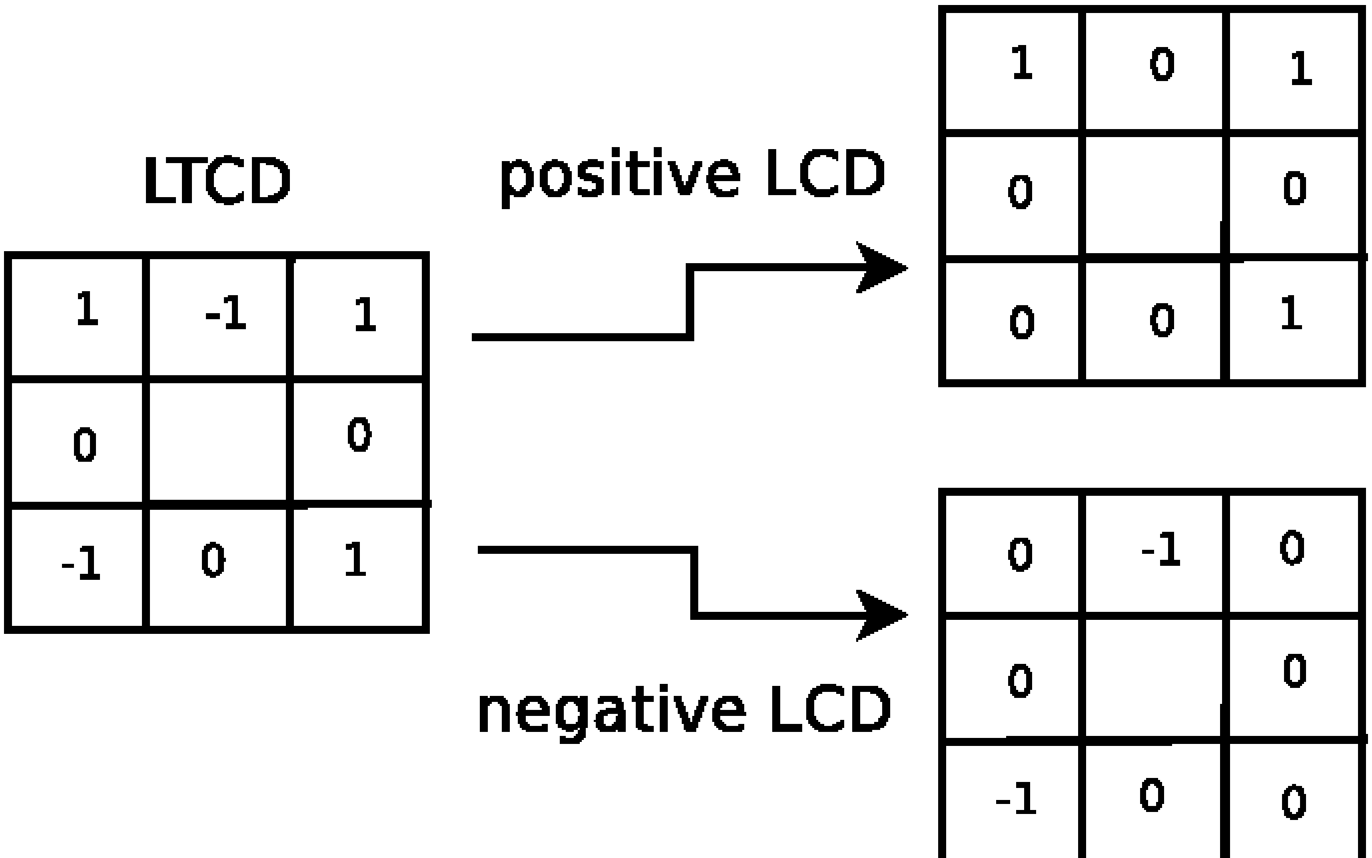

LTCD
1
-1
1
0
0
-1
0
1
positive LCD
1
0
1
0
0
0
0
1
negative LCD
0
-1
0
0
0
-1
0
0

Table 1 System workflow. Combination of methods used for feature extraction and recognition.

Image Preprocessing	• Histogram Equalization
Face Detection	• Haar-like Feature
Face Alignment and Extraction	• Active Shape Model
Feature Extraction Methods	• Local Binary Pattern • Gabor Filter • Fast Wavelet Transform • Local Adaptive Ternary Pattern • Histogram of Oriented Gradient • Sobel
Recognition Methods	• SVM*, 2DPCA**, Fisherface & AdaBoost***

*SVM - Support Vector Machine
**2DPCA - 2-dimensional Principal Component Analysis
***Adaboost - Adaptive Boosting Method

http://robinhsieh.com/?p=156

Table 2 Various strategies and methods for various tasks.

Functions	Gender	Age	Expression	Identity
Input Image Data	Face	Eyes + Nose & Mouth	Eyes + Mouth	Face
Features	LBP PCA	HOG Gabor Filter LATP	Gabor Filter	Gabor Filter LATP Sobel LBP
Classifier	Binary-class AdaBoost-SVM	Multi-class AdaBoost-SVM	SVM	Multi-class AdaBoost